

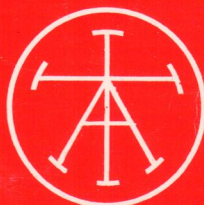
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DEFENCE INTELLIGENCE STAFF
(Directorate of Scientific and Technical Intelligence)

ARMY TECHNICAL INTELLIGENCE REVIEW



NUMBER 108
SUPPLEMENT



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ARMY TECHNICAL INTELLIGENCE REVIEW No 108 (SECRET)

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FOREWORD

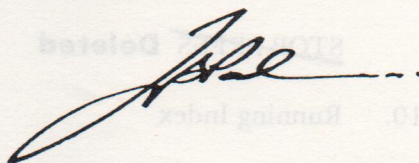
This Review begins with an article covering the latest information on the new Soviet self-propelled guns. As will be seen, two different versions of each have now appeared although these guns only entered the Soviet armoury a short time ago. Why this has happened is a question we cannot answer at present.

Of particular significance is the Soviet achievement in air-dropping their Airborne Infantry Combat Vehicle, the BMD without the use of a drop platform of any kind. Equally important is their impressive armed helicopter the HIND (Mi-24) now appearing in the Soviet forces in large numbers. Articles on each of these subjects will, we hope, be of considerable interest to our readers.

Developments in Soviet mine-laying and mine-clearing equipment are continually coming to light and articles on the two latest equipments for these respective tasks bring up-to-date previous assessments. The article describing the well-designed and effective NBC collective protection system included as an integral part of BMP illustrates well the attention the Soviets pay to this subject. The description of recent improvements in Soviet combat radio sets indicates no slowing down of effort in their attempts to increase the effectiveness of their command and control equipment.

An article on the Chinese Type 62 Light Tank pulls together all the intelligence we have on this AFV and completes the picture on this one.

The Moscow Parade this year was not profitable for us in many directions but at last SA-8 appeared and an article giving the latest assessment together with parade photographs is included. Finally the differences in the PORK TROUGH variants are described and illustrated.



T B PALMER
Colonel Tech Int (A)

1. New Information on Soviet SP Guns

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The two Soviet SP guns have been previously described in ATIR No 106(S) dated January 1975. Recent sightings of these guns have proved that both show certain variations from gun to gun, and this article describes what they are. There is as yet insufficient evidence to explain the reasons for most of these variations. The article also gives some new information on the 152 mm gun.

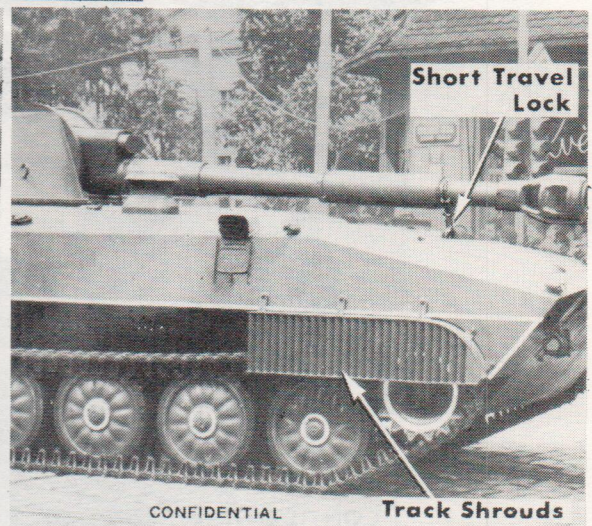
122 mm SP Gun M-1974

The first detailed information on this equipment was obtained when it appeared in the 1974 Warsaw Parade. It has been seen subsequently on a number of occasions in East Germany and in May 1975 it was paraded in Prague. It was the version which appeared in Prague that showed a number of external changes from those previously observed. (Figs 1 and 2).

- a. The amphibious track shrouds had before only been seen strapped to the rear of the turret. In Prague they were attached to the leading edge of the track guards and had a different shape and fin design from those previously sighted. It is not known why the shrouds differ from these seen on other models.
- b. On either side of the rear of the chassis, over the tracks, the amphibious hinged louvres were lowered for the parade and like the track shrouds had redesigned fins.



Fig 1. 122 mm SP Gun M-1974
Showing Track Shrouds
and rear louvres

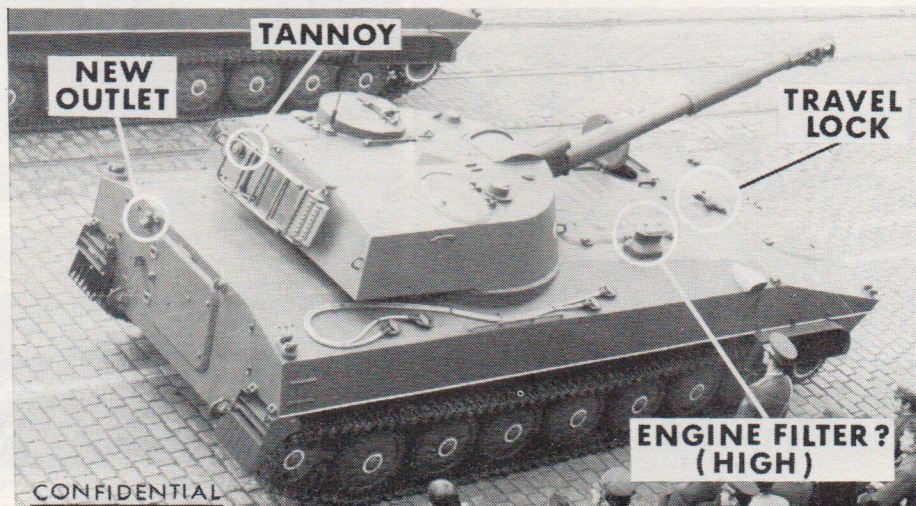


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- c. The gun travel lock on the Prague version was noticeably shorter. It is possible that this design provides more stability for the gun on the move but it restricts considerably the driver's view to his right.
- d. Located on the right side of the engine deck is an oval shaped protrusion which probably houses an engine filter. On the Prague version the protrusion was of a completely different shape and stood some 30 cms high as against 3-4 cms high on other versions. This increased height restricts the weapon traverse to the right and consequently must reduce the gun's effectiveness during direct fire engagements.
- e. On the rear of the chassis, above and to the left of the main door hinges, is a new outlet, possibly an access point for outside power. This innovation would reduce the need for running the engine when the gun was in a stationary fire position.
- f. To the left of the supports which hold the track shrouds and ladder on the rear of the turret is a small tannoy type speaker. This would be used for alerting detachments and relaying fire orders from the Command Post vehicle.
- g. A number of guns on the Prague parade had a squarish bulge to the left of the direct fire sight. The bulge was slightly curved with top and bottom edges chamfered.



Fig 2. 122 mm SP GUN M-1974
with modifications



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152 mm SP Gun M-1973

The only sightings of this equipment have been made in East Germany, but it is clear that there are two guns with distinct variations from each other. The variations all appear on the rear face of the chassis and can be clearly seen in Figure 4. The round hatch at the bottom right of the rear face (see Fig 3) is used for loading the separate ammunition but it is not known which aperture is used for ejecting the spent cases, nor is the reason for the alternative arrangements known.

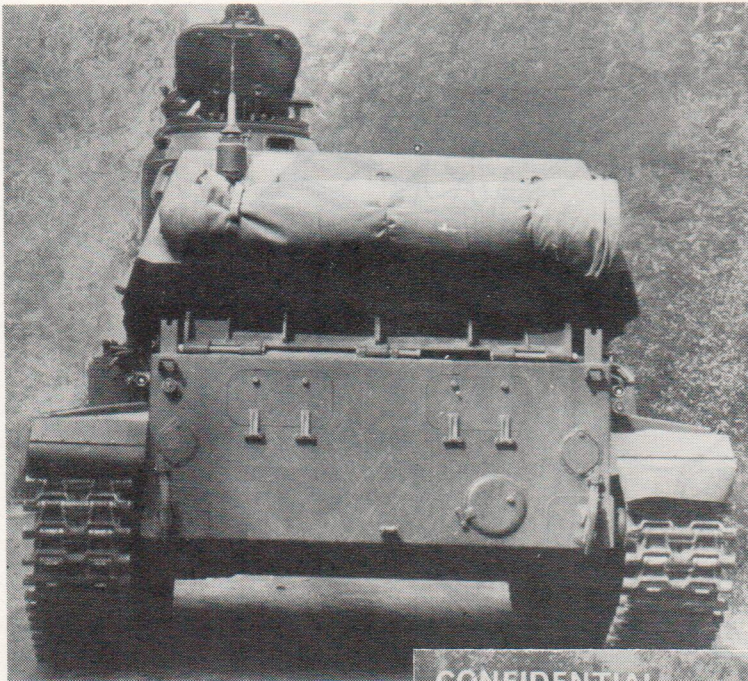


Fig 3. 152 mm SP Gun M-1973
Alternative layout of
Rear Hull Plate



Previous reports have indicated the presence of a reinforced metal plate which is hinged to the top rear section of the chassis below the turret (Fig 4). It is now clear that this plate can be removed from the deck and attached to the lower front part of the hull between the tracks (Fig 5). Why this heavy object is not left in the forward position permanently is not known. It is difficult to see how it could

be used as a spade unless the gun is pivoted to the rear for firing. This would complicate reloading and be impracticable for other reasons.

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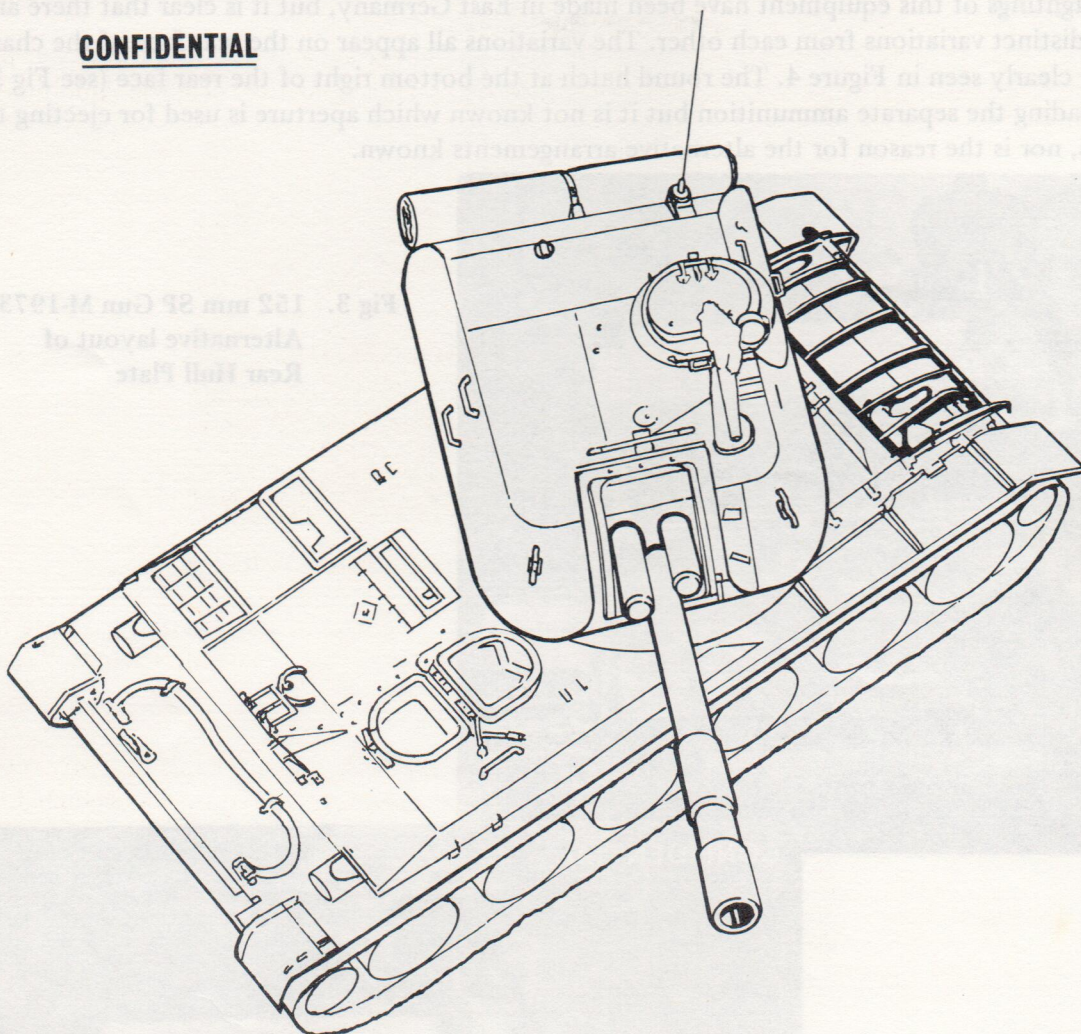


Fig 4. Artist's impression showing Reinforced Plate on Hull of
152 mm SP Gun M-1973

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It is now known that the travel lock arm for the gun can be released from inside the vehicle. This eliminates preparation time and permits the SP to deploy more quickly for action.

It is now also known that the machine gun mounted on the Commander's cupola is smaller than was previously realized. It is estimated that it is probably a 7.62 mm MG which indicates a primary role of local protection rather than air defence.



Fig 5. Location of Reinforced Plate

2. Air Dropping the AAICV-BMD

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Introduction

BMD was first seen in October 1970 and was at that time thought to be a new light tank. It was properly identified in November 1973, when it appeared on the Moscow Parade, as the Airborne Amphibious Infantry Combat Vehicle (AAICV).



Fig 1. Airborne Infantry Combat Vehicle BMD

BMD has a crew of two and can carry an airborne section of at least six men. To date it has only been seen associated with airborne troops and its primary role is believed to be an airborne MICV, however its good armament and high mobility make it suitable for other roles.

We have always assessed the vehicle to be airportable and air-droppable, however this has only recently been confirmed by a film screened on Moscow and East Berlin television that shows the vehicle being airdropped from a CANDID, IL-76.

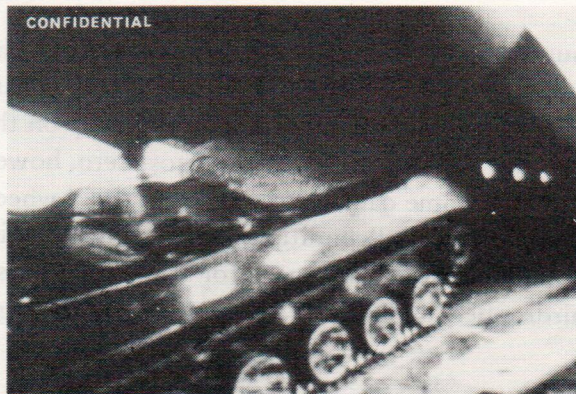


Fig 2. BMP Loading into CANDID, IL-76 Aircraft

Vehicle Characteristics

Crew	2 + 6
Weight	8-10 tonnes
Length	5120 mm
Width	2610 mm
Height	1830 mm
Main Armament	73 mm smooth bore gun SAGGER ATGW
Secondary Armament	7.62 mm co-axial machine gun
Other Armament	2 x 7.62 mm machine guns mounted in the front of the vehicle body.

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Air-dropping

The first view of BMD seen by the West showed the vehicle being driven off what appeared to be an unidentified heavy drop platform. At that time we knew of only two heavy drop platforms in general service, however neither was suitable for airdropping a vehicle of 8-10 tonnes. It is possible that BMD was initially dropped on a new platform, however the recent Soviet film shows that the vehicle is now dropped without a platform or shock absorption material of any kind. Fig 2 shows a BMD being reversed up the ramp of a CANDID IL-76.

The vehicle is dropped using an extractor retarder system in which extraction from the aircraft is achieved by an extractor parachute, the main parachute does not deploy until the load exits the aircraft. A retro-rocket retardation system is used to reduce the vertical forces on landing.

The parachute pack employed to airdrop the BMD is similar to the Heavy Drop Parachute used in clusters of 4 to drop the ASU-57 assault gun. After withdrawing the BMD clear of the aircraft the extractor parachute opens the main parachute pack, the main canopy appears to be enclosed in the canopy cover which is not drawn off by the extractor parachute until the suspension lines are fully extended. The single main parachute is possibly a 20 m diameter circular chute.

The Soviets have used a retro-rocket retardation system, the PRS-3500, with the Heavy Drop Platform, PP-127-3500, for some years. The retro-rocket system employed to drop BMD is much more powerful than the smaller system used with the Heavy Drop Platform. No details of the composition of the rocket propellant or the thrust generated are known, however the system will be designed to ensure that the load touches the ground with negligible vertical speed.

The BMD has a torsion bar suspension system that may be adjustable for height from within the vehicle. If the suspension can be raised and lowered hydraulically, when fully lowered for airdropping the top of each road wheel probably rests against a fixed rubber stop on the vehicle body. The use of the retro-rocket system will reduce the vertical speed to almost zero, however the load will have a horizontal speed due to cross wind. Some damage to the tracks, road wheels and suspension may occur on landing, particularly in gusty wind conditions. Without detailed information on the suspension of the BMD and the maximum permissible wind speed for airdropping it is impossible to estimate what percentage of the vehicles airdropped are likely to suffer sufficient damage to render them immovable on the dropping zone.

Conclusion

The ability to drop the Airborne Infantry Combat Vehicle, BMD, without a platform is a considerable achievement. This ability will offer the Soviets significant savings in manpower, materials and time when mounting a major airborne operation.

The employment of a retro-rocket retardation system allows the use of fewer and smaller parachutes as the parachute is used more for stabilization than deceleration. Although some vehicles will undoubtedly be damaged on landing and abandoned on the dropping zone we assess that the system significantly improves the Soviet airdrop capability.

3. Soviet Combat Assault Helicopter HIND - Mi-24 SECRET



Fig 1. HIND-A

Introduction

The Soviet Combat Assault Helicopter, HIND (Mi-24), was first sighted at Lyubertsy airfield, near Moscow, in the summer of 1971. It is the first helicopter specifically designed by the Soviets to carry armament. Previous to the appearance of HIND, the Soviets had always modified utility helicopters by the addition of strap-on armament.

HINDs were first seen deployed operationally in East Germany in 1973 and are known to be in service throughout the Soviet Union, including the Sino/Soviet border area.

Design

The HIND represents a radical departure from typical Soviet design practice. HIND exhibits several significant design features to improve forward flight performance including internal fuel storage, retractable tricycle landing gear and improved surface finish. The helicopter is also reported to have a sophisticated electronic fit giving it a day/night, all weather capability.

When comparing the HIND and Western armed helicopters, especially the US HUEY COBRA and prototype Armed Attack Helicopters, it should be remembered that the development work on HIND started in the mid-1960s. The design was undoubtedly greatly influenced by the US experience in Vietnam where, at that time, the Iroquois carrying strap-on armament was proving the effectiveness of armed helicopters in a fire support role.



Fig 2. HIND-B

Two variants of the HIND have been identified. The HIND-A (Fig 1) with anhedral wings with end plates and the HIND-B (Fig 2) with straight wings without end plates. It is probable that the HIND-B is a prototype aircraft as it has not been seen in service.

Characteristics and Performance

Characteristics

- a. Crew: Two pilots and a weapon system officer
- b. Troop capacity: 8
- c. Fuselage length: 16.9 metres
- d. Wing span: 6.64 metres
- e. Main rotor diameter: 17.0 metres
- f. Maximum AWW: 8400 kg
- g. Fuel: 1500 kg

Performance

- a. Maximum range: 600 km
- b. Maximum radius: 325 km
- c. Cruising speed (at 200 feet) : 315 km/hr
- d. Maximum speed (at sea level): 333 km/hr
- e. Service ceiling: 18000 feet

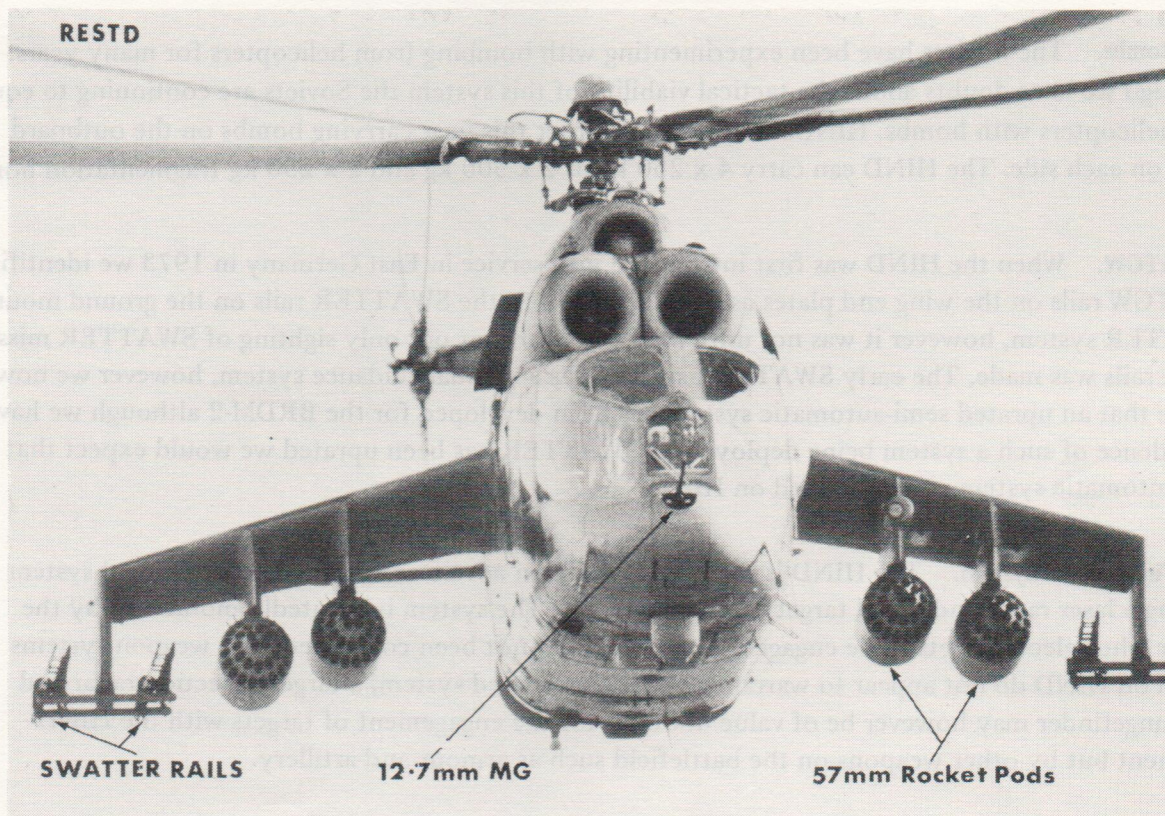


Fig 3. HIND-A

Armament

The HIND has been identified carrying a comprehensive range of armament. A heavy machine gun or cannon is carried in the nose (12.7 mm or 23 mm) and up to 128 57 mm, air-to-surface rockets are carried in four pods. In place of the rocket pods 250 or 500 kg bombs may be suspended from the wing pylons. In addition to this armament four ATGW missiles are carried on the wing end plates.

Machine Gun/Cannon. Some doubts exist as to the calibre of the nose weapon. Early sightings of HIND-A showed a 12.7 mm HMG in this position, however recent reports and sightings suggest that this weapon may have been replaced, on some aircraft at least, by a 23 mm cannon. There is also an unconfirmed report of two cannons carried in cupolas under the nose of the aircraft, forward of the nose wheel compartment. We are expecting the Soviets to introduce a larger, possibly 27 mm, cannon into service and it is possible that this sighting is of this weapon or of two 23 mm cannons. The mounting of a larger calibre cannon on HIND would significantly improve its anti-armour/anti-helicopter capability.

Rockets. The S-5 57mm air-to-surface rocket carried on HIND was originally designed as an air-to-air weapon but it is now used principally in an air-to-ground role. The rocket is unguided. Two warheads for the S-5 have been identified; the S-5M and the S-5K which have HE and HEAT warheads respectively. A white phosphorus smoke warhead is also believed to exist. The S-5 is carried on many Soviet helicopters in pods of 8 or 16 rockets, on HIND it is carried in pods of 32. Two variants of the HIND 32 shot pod have been identified. Each rocket pod on the aircraft is believed to carry a mix of HE and HEAT rockets and the pilot has the ability to choose which type of rocket is to be fired depending upon the target.

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Bombs. The Soviets have been experimenting with bombing from helicopters for many years. Although we have doubts about the tactical viability of this system the Soviets are continuing to equip their helicopters with bombs. HINDs were sighted earlier this year carrying bombs on the outboard pylon on each side. The HIND can carry 4 x 250 kg or 2 x 500 kg and 2 x 250 kg fragmentation bombs.

ATGW. When the HIND was first introduced into service in East Germany in 1973 we identified the ATGW rails on the wing end plates as being identical to the SWATTER rails on the ground mounted SWATTER system, however it was not until May this year that our only sighting of SWATTER missiles on the rails was made. The early SWATTER system was a manual guidance system, however we now believe that an uprated semi-automatic system has been developed for the BRDM-2 although we have no evidence of such a system being deployed. If SWATTER has been uprated we would expect that the semi-automatic system would be used on HIND.

Fire Control System. The HIND is reported to have an advanced automated fire control system utilising a laser rangefinder and target acquisition radar. The system is reputedly monitored by the gunner who selects targets to be engaged. This report has not been confirmed. The weapon systems carried on HIND do not appear to warrant such an automated system, a target detection radar and laser rangefinder may however be of value not only for the engagement of targets with the HIND armament but by other weapons on the battlefield such as armour and artillery.

Production

The HIND-A went into series production in the first half of 1972. Initial production was at Arsenyev, subsequently production was started at a known helicopter plant at Rostov in mid-1973. Total production to date has been approximately 450 aircraft. Although the present yearly production rate is assessed at about 190 production at Rostov could be greatly expanded if the Soviets considered it necessary either to equip their forces at an increased rate or to provide the aircraft to their allies.

It is difficult to estimate final production numbers but a total production of at least 1500 aircraft is expected.

Employment

The HIND was probably designed as a combat assault helicopter with the dual tasks of fire support and armed transport. The primary transport helicopter is the HIP (Mi-8) and HIND may well be intended as a support gunship for air assault operations using the HIP as the transport aircraft.

With the introduction of HIND into service however the Soviets appear to have realised that its armament fit makes it a far more flexible weapon system than they at first envisaged. The Soviets do not appear to have finally decided how this aircraft will be employed. If the HINDs are used in a normal fighter ground attack role or in conjunction with fixed wing aircraft, control will be retained at Front or at Army level; however on certain tasks, such as combat assault operations, operational control for the period of the particular operation may well be delegated down to Division.

Although HIND is equipped to operate in an anti-tank role using ATGW the Soviets do not appear to have devoted much training to this task. Similarly the aircraft does have an anti-helicopter capability but we have little evidence to suggest that it will be used in this role.

Further Development

The recent development of HIND indicates the beginning of a new trend in Soviet helicopter design. This system apparently affords maximum combat versatility and flexibility in a single design. Further modifications will include adaption of weapon systems currently under development, plus rotor improvements for high speed flight.

As helicopter armament and weapon systems become available it is possible that the Soviets could re-design HIND with a refined airframe for gunship duties. Such a new airframe would eliminate the cargo area, reduce fuselage width to about 1 m, provide step down tandem seating for a crew of two and provide accommodation for new integrated weapon systems. These modifications associated with improvements in rotor design and power plant would improve HIND's performance, particularly manoeuvrability, to make this aircraft a very formidable weapon system.

In the near future we expect to see a 23 mm or larger calibre cannon mounted on HIND; such a weapon will significantly improve its anti-armour/anti-helicopter capability. The ATGW carried on HIND in the future will certainly be semi-automatic, if the SWATTER system at present fitted has not already been upgraded to give it this capability. Other weapon improvements in the longer term may include new air-to-surface rockets and cluster bombs.

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In the near future we expect to see a 33 mm or larger caliber cannon mounted on HIND; such a weapon will significantly improve its anti-aircraft/anti-helicopter capability. The ATGW carried on HIND in the future will certainly be semi-automatic. If the SWATTER system is present fitted has not already been upgraded to give it this capability. Other weapon improvements in the longer term may include new air-to-surface rockets and cluster bombs.

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4. Developments in Soviet Engineer Equipment **SECRET**

A. BTR-50PK Mine Clearer M-1972 (Figs 1-2)

This article supersedes the report on the BTR-50PK mine clearer M-1972 in ATIR Supplement No 105 dated July 1974.

The Soviet Army places great emphasis on rapid mine clearance. A large proportion of Warsaw Pact tanks can be fitted with mine clearing ploughs and rollers but these adversely affect the tank's steering and its rate of movement whilst ploughing and the tanks are still vulnerable to anti-tank mines with influence and other special fuzes. Mine clearance by rocket projected explosive means, therefore offers a worthwhile pay-off especially if the equipment is fully mobile.

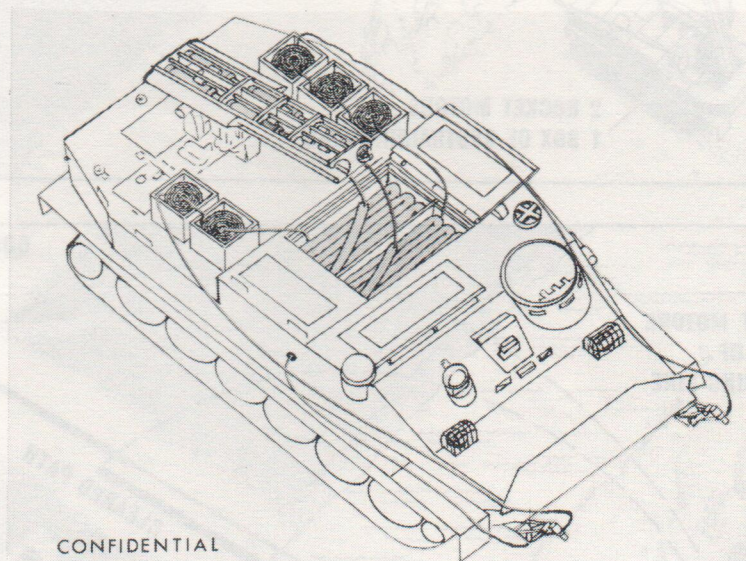


Fig 1. BTR-50PK Mine Clearer M-1972

The modified BTR-50PK Armoured Personnel Carrier, carrying a rocket projected explosive hose mine clearing equipment, began to appear in Engineer Battalions of GSFG in 1972. Now each Engineer Battalion of a Division holds three of these equipments.

The BTR-50PK APC has been modified by mounting a two shot, twin rail rocket launcher on the rear deck over the engine and transmission. This launcher, which can be elevated but not traversed, points directly forward. The passenger compartment has been converted into stowage space for the mine clearing explosive hose: this space has the same horizontal dimensions as the roof hatches but is divided into two sections by a transverse vertical partition.

The explosive hose, which is segmented and not continuous, has an estimated diameter of 90 mm, and up to 140 m can be stowed in each of the two sections. If a single length of hose is projected, then assuming it contains a conventional solid or plastic high explosive, it would be expected to provide, with 80% effectiveness, a lane of at least 8 m clear of simple pressure operated single impulse fuzed mines, buried at normal depths. There would of course be a dip zone between say, 1-2 m either side of the centre line of the charge, where the effectiveness would fall to about 25%. Tilt-fuzed mines would be cleared from a lane about 5-6 m wide whilst pressure operated blast-proofed or long pressure pulsed fuzed mines would be destroyed over a width of about one metre.

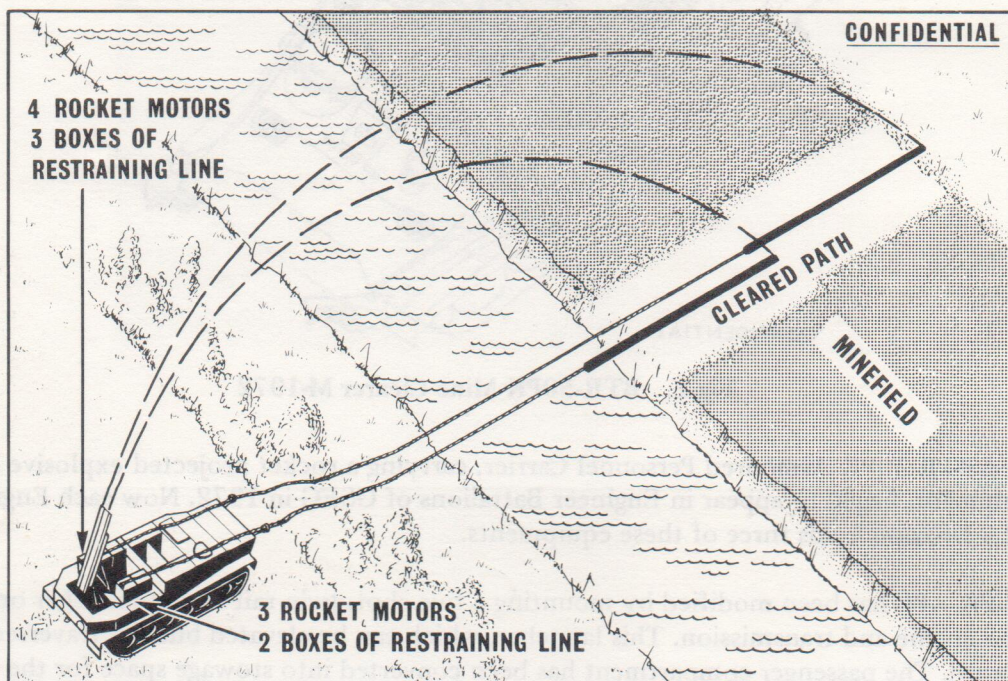
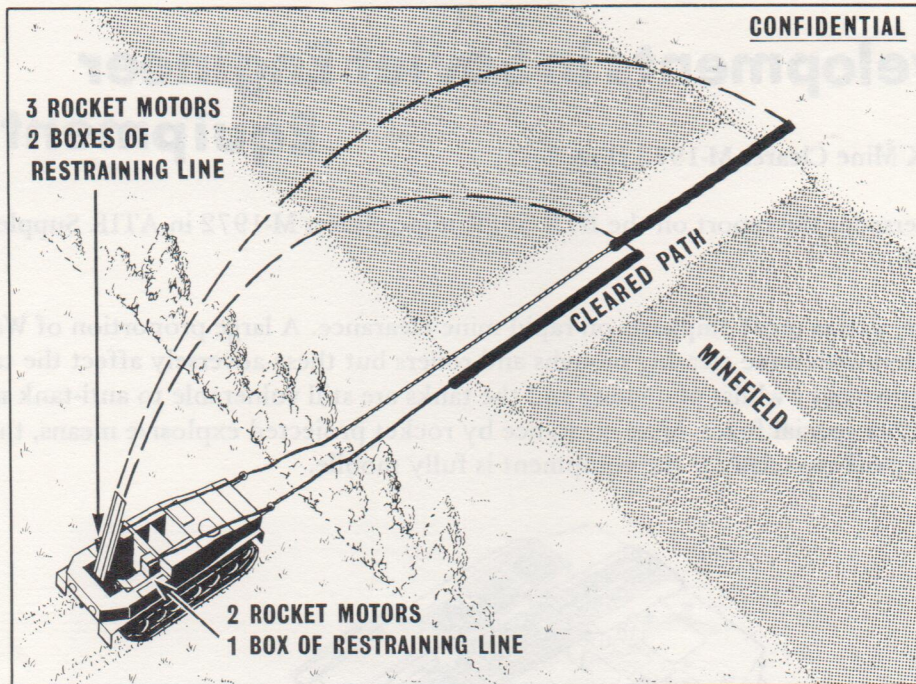


Fig 2. Artist's Impression of BTR-50PK Mine Clearer in action

On the rear deck of the vehicle at each side there are three low rectangular frames for locating three boxes of cord. This cord incorporates an electrical line for initiating the explosive charge from within the vehicle; it probably also acts as a means of retarding the flight of the hose or of controlling its range. The length of the cord in each box is likely to be of the same order as the length of the main explosive charge. In this way by firing the first charge with one box of restraining line, followed by the second charge with two boxes of restraining line — or by using two boxes followed by three — a gap of 250 m or thereabouts could, at best, be cleared through a minefield without moving the vehicle and without making further measurements of distance and angle of firing, under reasonable weather conditions.

The rocket launcher rails are long enough to allow up to four rocket motors to be placed on them in tandem. It is thought that two, three or four rocket motors may be used for each firing to achieve the different ranges noted above. A single rocket motor does not appear to be used on its own.

Although up to now it has been assumed that a single hose will be projected behind each rocket, there is some evidence that instead, at each shot, two shorter lengths of hose (70 m or less) might be connected side by side behind the rocket. If this is the case, the gap that could be cleared through a minefield with the two shots, would be reduced to about 120 m. The increase in effectiveness that would result would depend upon how far apart the hoses lay when the explosive charge was fired.

Insufficient detail is available as yet to estimate the stand-off distance of the equipment, that is the range to the tail of the explosive hose. Figures of 200, 350 and 500 m for two, three and four rocket motors respectively have been quoted but the precise circumstances in which they are supposed to apply are not known.

The new BTR-50PK mine clearer M-1972 represents a significant improvement in Soviet mine clearing capability especially in the time required to breach a minefield. However because there will still be some uncertainty about the cleared path, it is likely that the Soviets will continue to use mine ploughs and rollers to supplement explosive charges whenever possible and when time permits. Further developments in improved mine clearing by explosive means must be expected.

B. Soviet Armoured Tracked Minelayer GMZ (Figs 3-6)

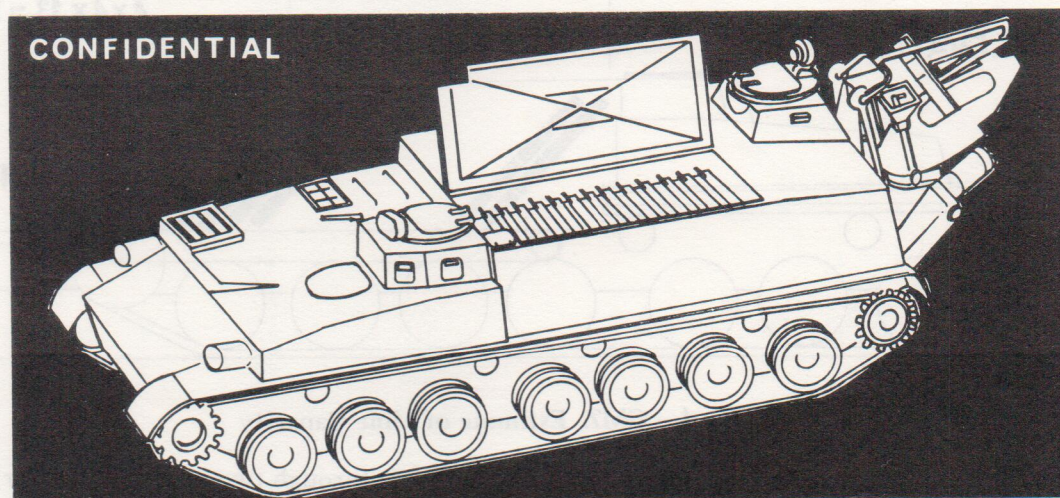


Fig 3. GMZ Armoured Tracked Minelayer

Soviet Army doctrine draws attention to the value of rapidly laid minefields for the protection of the flanks of an armoured thrust. To improve the speed of minelaying, the Warsaw Pact armies have over the years introduced various trailer mounted minelaying devices, the latest of which are the PMR-3 (Fig 5) and PMR-60 (Fig 6) which could be towed either by trucks or APCs. In 1965 a new specialist Armoured Tracked Minelayer GMZ was first sighted in East Germany. Although a more expensive solution to the problem of rapid minelaying, this offered the Soviet engineers greater mobility and better armour protection in the minelaying role. After a long period of development and trials, this new equipment is now entering service on a scale of three equipments in each Divisional Engineer Battalion of the Tank and Motor Rifle Divisions.

The vehicle has a crew of 3; commander, driver and minelaying operator. There is a KPV 14.5 mm Heavy Machine Gun mounted on the commander's cupola. The GMZ is based on the GANEF chassis but the body of the vehicle has been modified. This has led to an increase in the height of the cargo compartment of the vehicle. The minelaying mechanism with its plough blade, is supported centrally from the rear of the vehicle. When the mines are to be laid the plough is lowered from within the vehicle. One man controls the minelaying, including presumably the depth and spacing at which the mines are to be laid: he is located at the right rear of the vehicle and is provided with a small fixed turret.

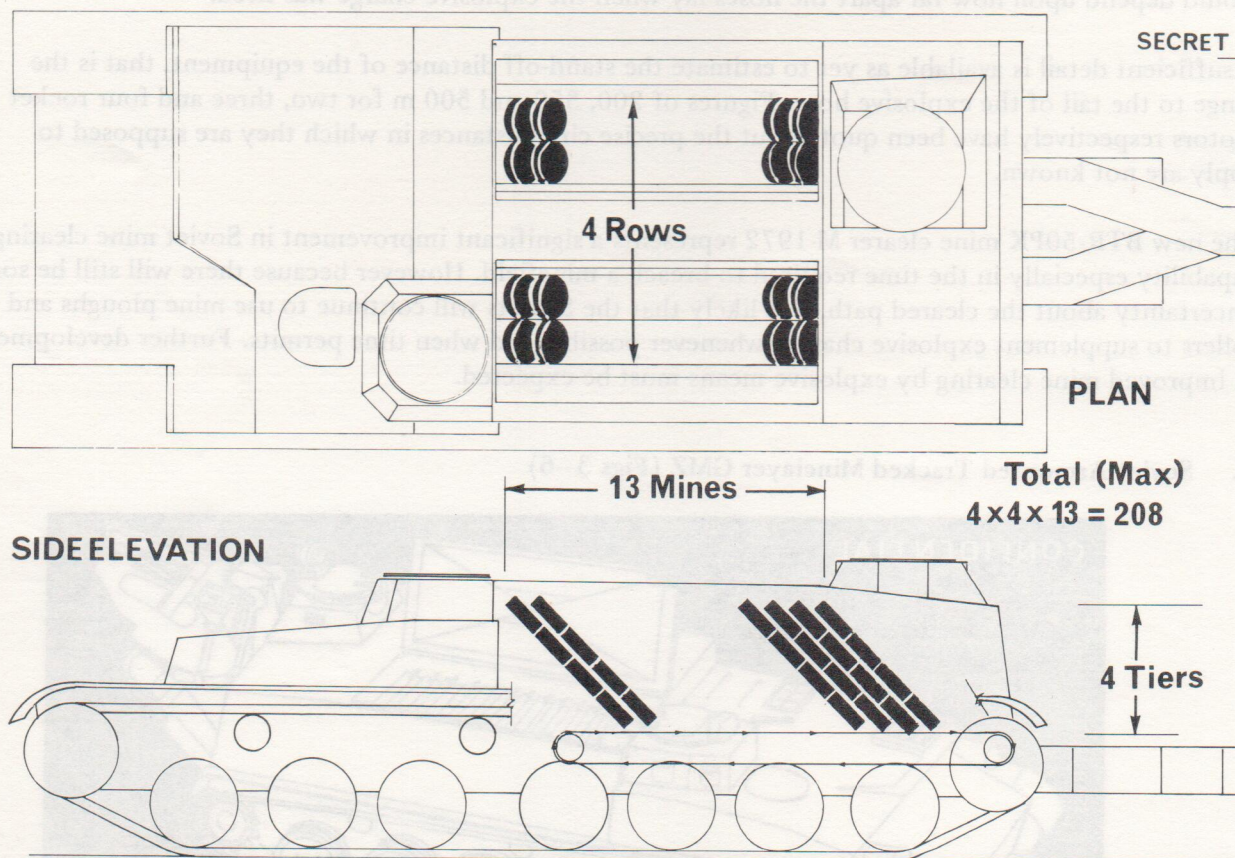


Fig 4. GMZ Estimate of Mine Capacity

Mines are stowed in the centre section of the vehicle. Access is through two large rectangular hatches on the top of the vehicle, one on each side; these hatches are hinged on their inner edges. Beneath the hatches are two large compartments in each of which there are 13 transverse racks and each rack appears to be designed to accept anti-tank mines of the dimensions of TM-46 and TM-57. The mines are placed in the racks on the slant. In each compartment, each rack holds two mines side-by-side, four deep; this would give a maximum mine holding of 208 mines. The mines appear to be fed to the laying mechanism by gravity on to conveyor belts which first take the mines to the rear of the vehicle and then inwards to the central laying chute. Since there is no space for a crew member to arm the fuzes, the mines must be armed automatically which indicates that new fuzes have probably been developed for use with this machine. There is no indication that anti-personnel mines can be laid by GMZ.

It is estimated that GMZ can lay anti-tank mines at an average speed of about 5 km/h. Additional first line holdings of about 400 mines for each GMZ are carried in the unit's logistic vehicles: however no information is available on how the vehicle is re-filled with a fresh supply of mines, and so the overall laying speed cannot be assessed. If filling had to be done by hand, it is estimated it would take 10-15 minutes.



Fig 5. PMR-3 Mine Layer



Fig 6. PMR-60 Mine Layer

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It is estimated that GMS can lay anti-tank mines at an average speed of about 5 km/h. Additional first line holdings of about 400 mines for each GMS are carried in the unit's logistic vehicles; however, no information is available on how the vehicle is re-filled with a fresh supply of mines, and so the overall laying speed cannot be assessed. If filling had to be done by hand, it is estimated it would take 10-15 minutes.



Fig 5. PMR-3 Mine Layer

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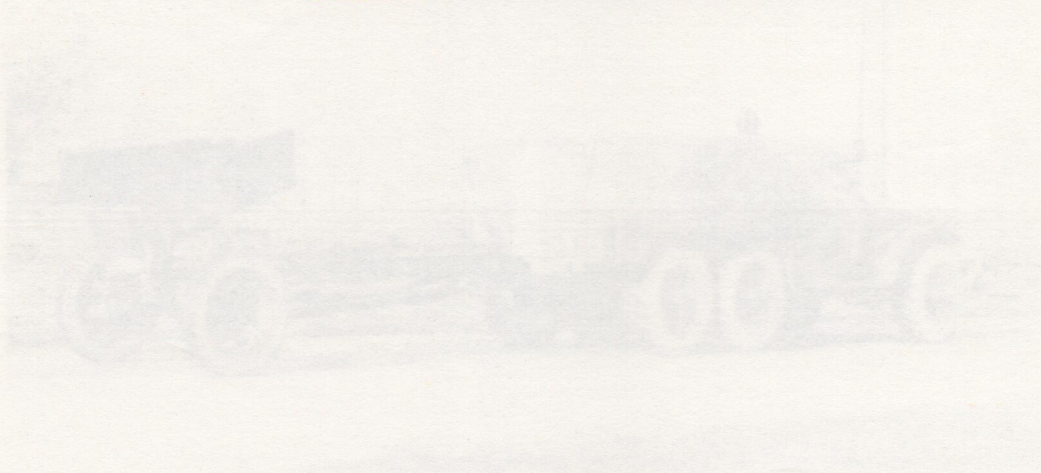


Fig 6. PMR-60 Mine Layer

5. Collective Protection in BMP 'A'

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Recent intelligence on the collective protection system in BMP A (Fig 1) is the first indication of a level of crew protection greater than that offered by T-62 which excludes only radioactive dust. BMP has a collective protection system of such complexity that it was clearly designed for installation in the early stages of the BMP design project and not added as an afterthought. Protection against nuclear, chemical and biological hazards enables the vehicle and crew to travel over a wider area of the battlefield.



Fig 1. BMP

The collective protection system consists of the axial compressor fan (Fig 2), the nuclear, biological and chemical filter FPT-200M (Fig 3) and the internal plumbing linked to the covered air intake (Fig 4).

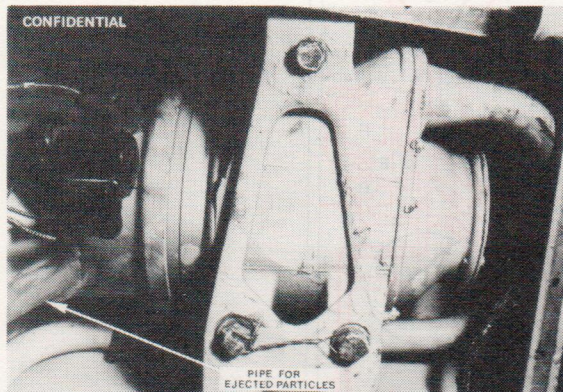


Fig 2. Axial Compressor Fan

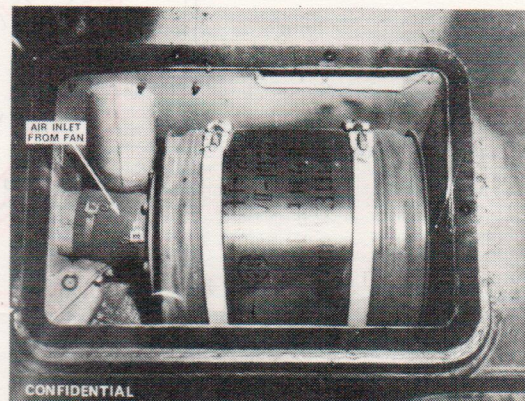


Fig 3. FPT-200M Filter

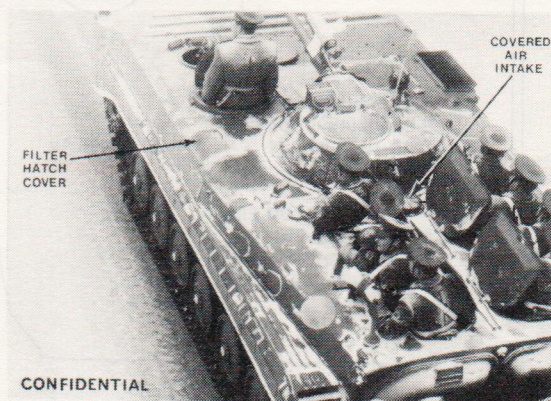


Fig 4. Covered Air Intake

The collective protection system works by removing particles including normal and radioactive dust then removing chemical or biological aerosols and vapours. The compressor fan D (Fig 5) which sits in the airtight well C draws air in through covered intake A and around the base of the turret ring to the distribution box B whose fixed angled vanes ensure that more air goes to C. The compressor fan D ejects any particles including radioactive dust back to the distribution box B from where it enters the engine air filter H which is of the cyclonic variety (Fig 6). Air, free of particulate matter leaves H for the engine and any excess pressure escapes via valve J where it vents from the vehicle beside the engine exhaust (Fig 7). Air from which particles and dust have been removed leaves D and passes through valve E which is used in non-NBC conditions to by-pass the filter F. Air passing through F is cleaned by the pleated paper removing very fine particles of chemical agent or biological agent aerosols which may have escaped D and by finely divided charcoal which removes any toxic vapour or gas. The air thus purified passes through junction box G to vent at face level at each manned position inside the vehicle (Fig 8) with the possible exception of the gunner.

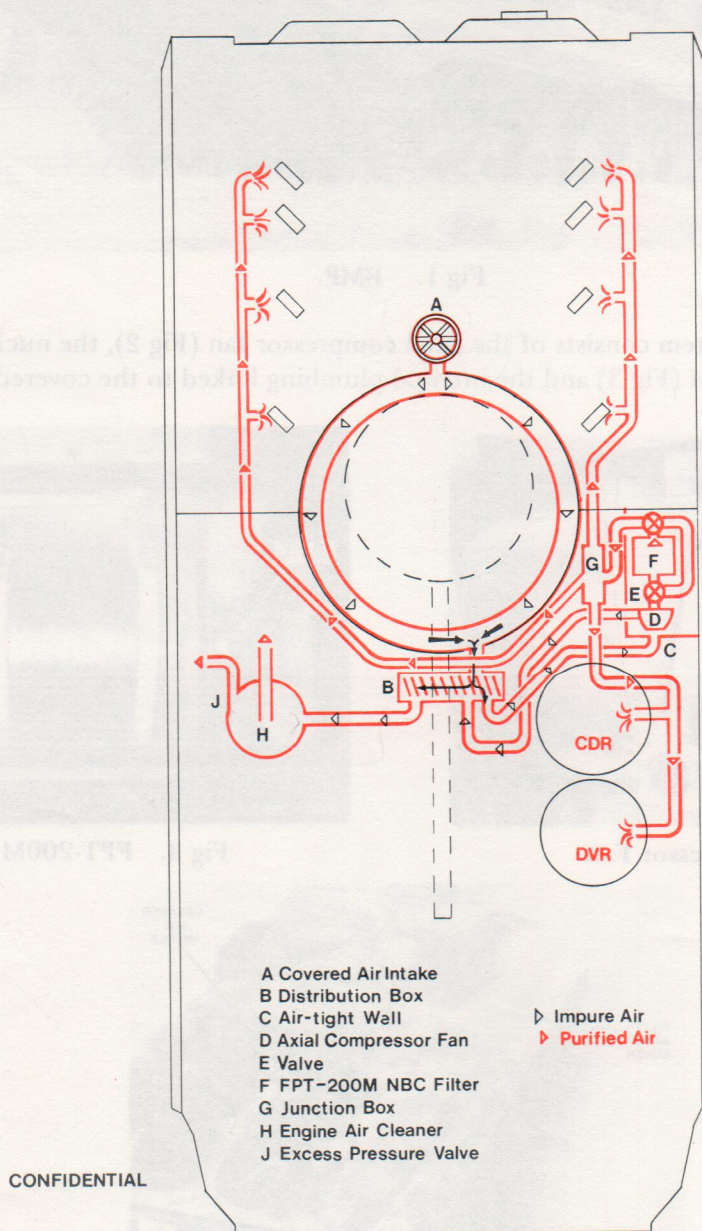


Fig 5. Diagram of Collective Protection System

In operation, the collective protection system is controlled by the commander. Warning is received of a nearby nuclear burst either by radio, visual means or a radiation detector when one is mounted in the vehicle. The commander presses a button which shuts all the vents and intakes automatically to prevent the blast wave creating internal damage. After the blast wave has passed, he opens the air intake and exhaust vents and starts the axial compressor fan and engages the filter. If the system has merely been providing ventilation, the filter is simply engaged by adjusting valve E. He takes similar action on receiving a chemical agent warning except there is no requirement to close the air intake and vents since there is no potentially damaging blast wave.



Fig 6. Engine Compartment

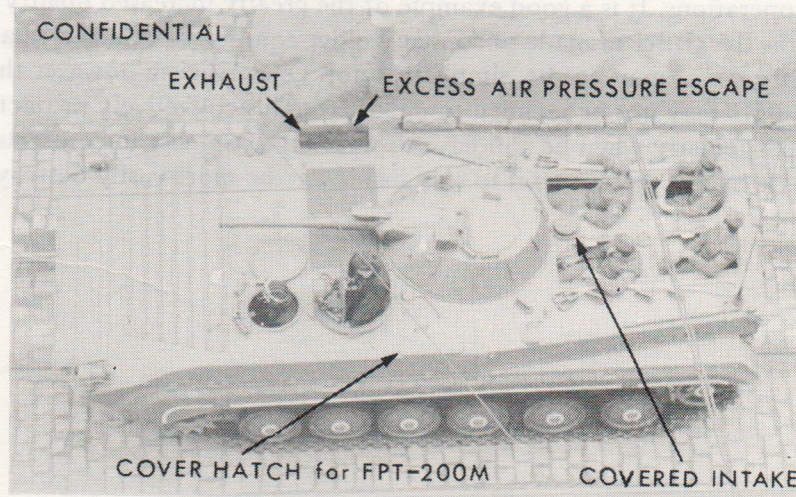


Fig 7. Superior View of BMP

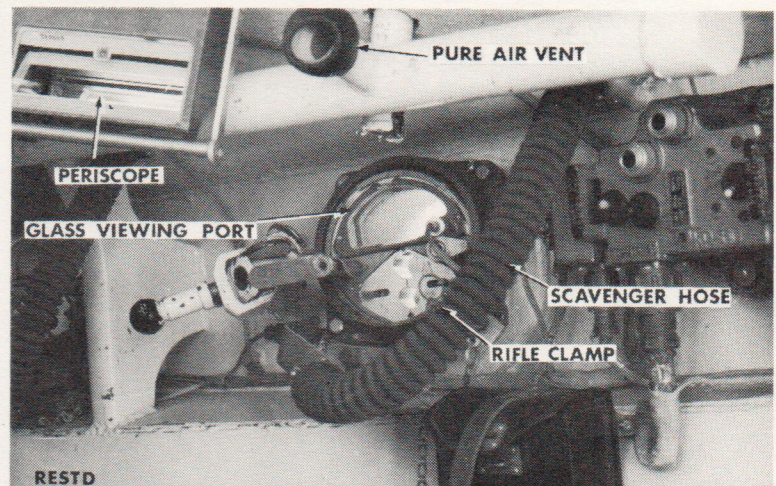


Fig 8. Weapon Port
in BMP

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In this way the collective protection system can supply about 200 m³ of purified air per hour. This is more than adequate for a comfortable and acceptable internal atmosphere. The axial compressor maintains the internal pressure at about 100 Pa (roughly 10 mm water gauge pressure) above atmospheric pressure. However this overpressure cannot be maintained when weapons are fired and the scavenging system is employed. The scavenging system works in the opposite manner to the collective protection system by drawing air out of the vehicle. Of the nine infantry firing positions eight are fitted with attachments to suck combustion gases and fumes through expandable hoses to the scavenging plumbing network (Fig 8).

It has been reported in the case of one particular BMP that when the scavenging and collective protection systems are running simultaneously there appears to be a net underpressure. This would allow toxic or radioactive vapours or particles to enter BMP through tiny holes and gaps. A similar result appears to be evident when BMP is travelling at speed with only the collective protection system engaged. This phenomenon would be caused by aerodynamic drag creating low pressure areas on the leeward part of the vehicle. The underpressure appears to be very slight and could be caused by a few minor leaks due to manufacturing and operating faults. In view of the care and effort which clearly have been expended in the design of the collective protection system it is unlikely that such an elementary and fundamental fault is common to all BMPs.

The BMP has a collective protection system which is indicative of the Soviet thinking on the probability of NBC operations. It is a good example of the greatly increased quality of recent Soviet equipment and refutes the criticism made of so many older equipments, namely that they are simple and rugged. Rugged it may or may not be, simple it is not. One criticism however that is valid: the Soviet soldier in the BMP may not be inclined to debus from his collectively protected MICV in a toxic environment, particularly when he will have to wear his extremely uncomfortable OP-1 protective clothing. He may therefore tend to stay inside and be more easily destroyed by anti-armour weapons.

6. Recent Improvements in Soviet Combat Radio Sets **SECRET**

Introduction

One of the main drawbacks of Soviet combat radio equipment in use up to 1970 was the limited frequency coverage, particularly of VHF sets. Such sets as the R-105 and R-108 covered only small portions of the frequency band. Different combat arms used different radios and, for instance, there was no frequency overlap between the VHF radios used by the artillery and the infantry. Since the late 1960s, six new radio sets have been introduced. The three VHF sets all cover the same, much increased frequency band. The three HF sets also have improved frequency coverage and are capable of single sideband (SSB) operation. A table of the main characteristics of these radios is at the end of this article (on page 28).

VHF Radio Sets

R-107 and R-111

Fig 1 shows the R-107 VHF manpack and Fig 2 the R-111 VHF vehicle set. These two sets are of the same basic design. They both incorporate transistors and miniature valves and are of modular construction using printed circuit boards. Some of the modules are common to both types of radio. Both sets cover the frequency range of 20-52 MHz and have 1280 RF channels spaced at 25 kHz. The R-107, which weighs 19 kg, has a power output of 2 watts. The R-111 has a high power amplifier which gives it a power output of over 50 watts. The R-111 incorporates automatic tuning and both sets have a facility for pre-selecting four frequencies which allows rapid frequency changes to be achieved.



Fig 1. R-107 VHF Set

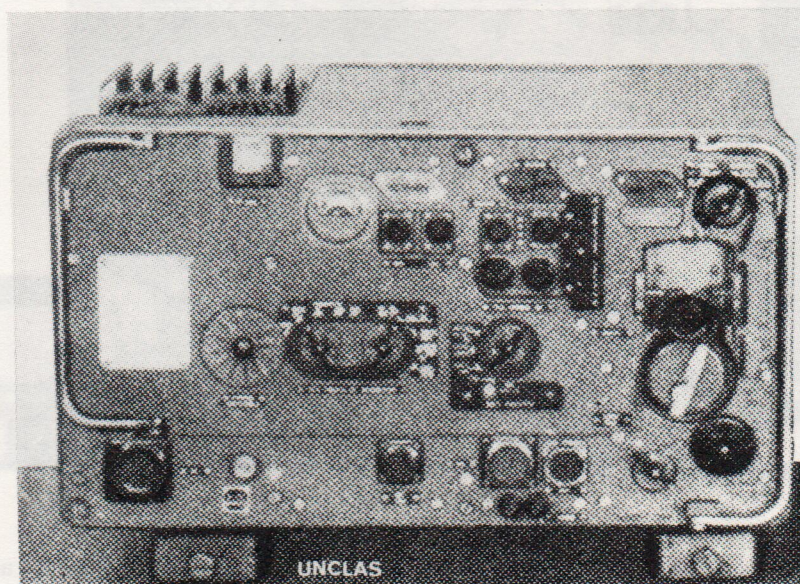


Fig 2. R-111 VHF Set

R-123M

Fig 3 shows the R-123M. This is the VHF FM tank radio set which has replaced the R-113. It is also the set fitted in other armoured vehicles. It has a 20 watt power output and covers the frequency range of 20 MHz to 51.5 MHz with 25 kHz channel spacing. This set also has four pre-selected frequencies. It is almost the same set as the R-123, details of which were published in ATIR(S) No 103.

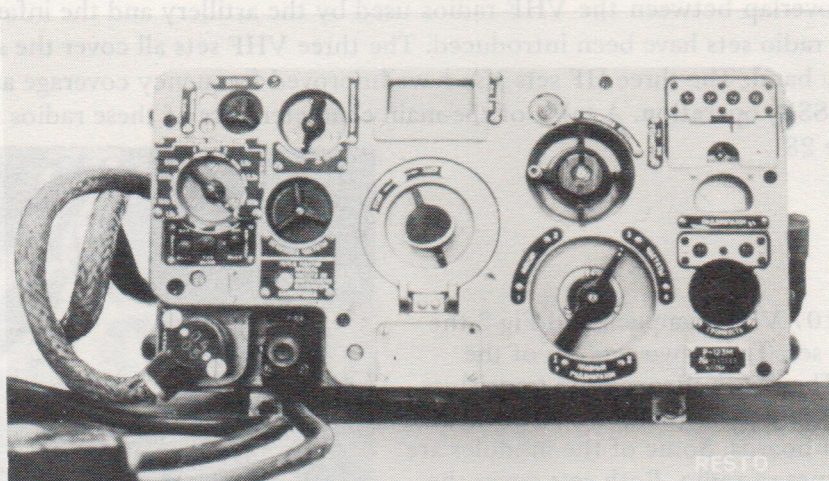


Fig 3. R-123M VHF Set

HF Radio Sets

R-130

Fig 4 shows the R-130 HF radio. It is the HF radio most commonly used forward of Divisional headquarters and is used as far forward as infantry battalion and tank company headquarters. It has 949 RF channels spaced at 10 kHz intervals in the frequency range 1.5 MHz to 10.99 MHz with a power output of 40 watts. It is thought to use a frequency synthesiser and provide SSB voice, morse and teleprinter operation.

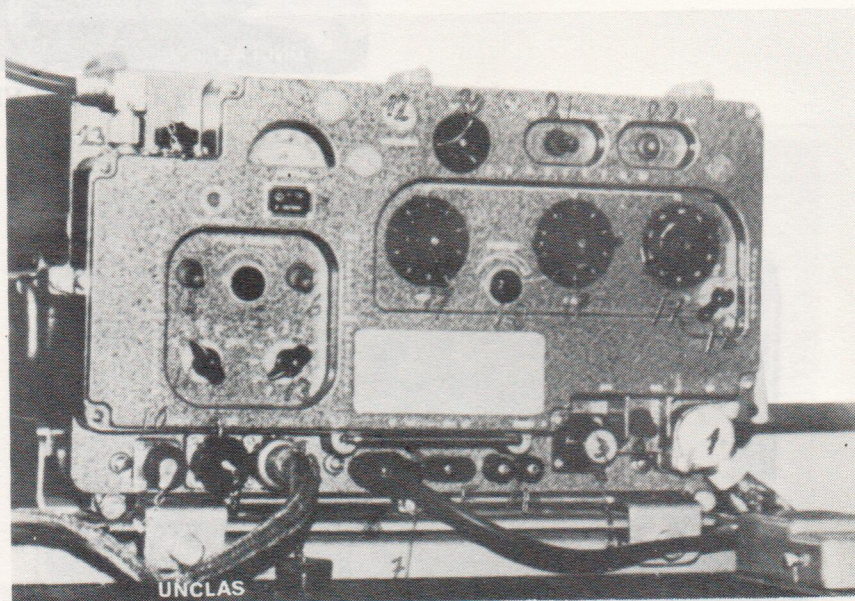


Fig 4. R-130 HF Set

R-129

Little is known about the R-129 manpack set. It is an SSB voice set weighing 19 kg and providing 1000 RF channels in the frequency range 1.0 MHz to 10.99 MHz. It has a power output of 8 watts.

R-140

Fig 5 shows the R-140 HF radio station. It is used on HF links behind division headquarters. The R-140 covers the frequency band 1.5 MHz to 30.0 MHz and has a power output of between 800 and 1800 watts depending on frequency. The station provides SSB voice, morse and teleprinter operation and incorporates an on-line speech security device. The right hand antenna in Fig 5 is for the R-405 radio relay set which is used to remote the station away from its headquarters.



Fig 5 R-140 HF Set

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MAIN CHARACTERISTICS

VHF Sets

	R-107	R-111	R-123M
Frequency Range (MHz)	20-52	20-52	20-51.5
Number of Channels	1280	1280	1261
RF Channel Spacing (kHz)	25	25 (est)	25
Power Output (Watts)	1.0	more than 50	20
Antenna	Whip	Whip	Whip
Weight (kg)	16	—	—
Type	Manpack	Vehicle	AFV/ACV

HF Sets

	R-129	R-130	R-140
Frequency Range (MHz)	1.0-10.99	1.5-10.99	1.5-30
Number of Channels	1000	949	285 000
RF Channel Spacing (kHz)	10	10	100 Hz
Power Output (Watts)	8	High-40 Low-8	up to 1800
Antenna	Whip Dipole	Whip Dipole	Various HF antennas
Weight	19 kg	—	9-11 tonnes incl vehicle
Type	Manpack	AFV/ACV	Vehicle
Modulation	SSB	SSB	SSB
Facilities	Voice	Voice Morse RATT	Voice Morse RATT

7. The Chinese Type 62 Light Tank SECRET

Background

At the time of the withdrawal of Soviet technical assistance in 1960 the Chinese had almost exclusively Soviet tanks in service, ie T-34, T-54 and a few PT-76s. In addition their own tank the Type 59, an almost exact copy of the Soviet T-54A, had entered production the previous year in a factory set up by the Soviets. It was with some surprise that in 1968 news was received by the West of the existence of a new tank of Chinese design and manufacture that had apparently been in service for some years. This tank, the Type 62 is in many respects also a copy of the Soviet T-54A to which it bears a close resemblance, but it is smaller and very much lighter.



Chinese Type 62 Light Tank

Fire Power

All the armament of the Type 62 is based on Soviet tank weapons of World War II vintage. The main armament is an 85 mm rifled gun, a copy of that in the T-34/85 but slightly shorter and with a short fume extractor added about 250 mm from the muzzle. There are two natures of ammunition, HE and AP HE. The HE would normally be used against area or soft targets and is effective up to a range of 5000 metres. The armour piercing HE is out of date by Western standards and although accurate enough to engage armoured vehicles at up to 2000 metres range, its penetration is very poor; only 30 mm of vertical armour can be penetrated at this range and even at closer ranges the round would still be ineffective against modern medium tanks. Because the round explodes after penetration, if it does get through, considerable damage is invariably caused. A total load of 47 main armament rounds is carried, the mix depending on operational circumstances.

For secondary armament Type 62 is provided with two 7.62 mm MGs, one mounted in the turret co-axially with the 85 mm and the other behind the front glacis. The latter is aimed by the driver and fires through a small hole just below the wading plate. The 12.7 mm anti-aircraft MG is mounted on the loader's hatch cupola. This weapon has only a simple optical sight and it is cumbersome to traverse and aim. Its performance is therefore limited to head or tail-on targets or slow moving aircraft such as helicopters.

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Powered elevation and traverse is provided for the main gun but there is no stabilisation; neither is there any form of night fighting aid such as IR. White light would have to be provided from an outside source for the tank to be used at night.

Mobility

The tank is powered by a 430 hp diesel engine, a de-rated copy of the well known Soviet V-12 tank engine. The engine is extremely reliable and does not suffer from oil leaks, a fault common in UK tank engines. Top speed is 60 km/h and with a power to weight ratio of 20.5 bhp/ton the tank has good acceleration and off-the-road performance. It is possible to make the tracks spin when starting off in sand.

The layout of the running gear and suspension is the same as in the T-54A. The modified Christie type is used with torsion bar springing. The five single road wheels on either side run between twin horns on the inside of the track. There are two types of road wheel. The earlier type were pressed steel with ribs of the same design as the Soviet PT-76 series tank wheels, while the later type, shown in Fig 1, are of a cast ribbed type.

As with the Soviet tanks, a large proportion of the fuel is stowed externally on the right hand track guard. The fuel tanks can be clearly seen in the picture, but there is no provision for disposable auxiliary fuel drums to be mounted on the rear. The range is of the order of 400 km of mixed motoring.

Protection

With an overall weight of only 21 tons the armour protection of the Type 62 is of necessity fairly light. The turret is a one piece casting, 65-75 mm thick at the front and 45 mm at the sides. The hull is made from rolled steel armour and is of welded construction. The glacis is 25 mm at 60° and the sides are 18 mm thick. There is no air filtration or NBC protective system fitted.

General

Sometime after they began making the Type 62, the Chinese also began to produce their amphibious hybrid the Type 60/63. This tank is based on the PT-76 hull but with a turret of similar shape to that of the Type 62, and with the same 85 mm gun. It is therefore not clear why they are producing 2 models of light tank. However the Type 62 has been widely exported as its unsophisticated nature makes it particularly suitable for the armies of the emergent nations. Of the 700 or so Type 62s produced to date over 300 have been exported, many of them to African countries; Sudan, Tanzania, Congo Brazzaville and Zaire are known to have it. It is also to be found in Albania, North Korea and Vietnam.

8. The SA-8 SAM System— Initial Parade Assessment **SECRET AUSCANUKUS**

Introduction

The SA-8 surface-to-air missile system was paraded in Moscow on 7 November 1975. This article is the initial assessment of the paraded systems.



Fig 1 SA-8 SAM System (Long Vehicle Version)

Description

The system was seen mounted on two close variants of the Amphibious Wheeled Load Carrier M-1973, the longer variant being 9 m and the shorter variant 8.7 m. Both the variants are believed to retain an amphibious capability and it is likely that one of them is a superseded prototype.

The system mounts four missiles. They appear to be fixed in elevation, which will detract from the minimum range when gathering onto low angle targets. The previous assessment of minimum range (ATIR No 107 Supplement) is now increased to about 2 km. The rear fins appear to be designed to rotate and cut-outs have been made to clear the probable beacon and guidance receiver antennae. The missile may be made in two halves and be latched in the centre.

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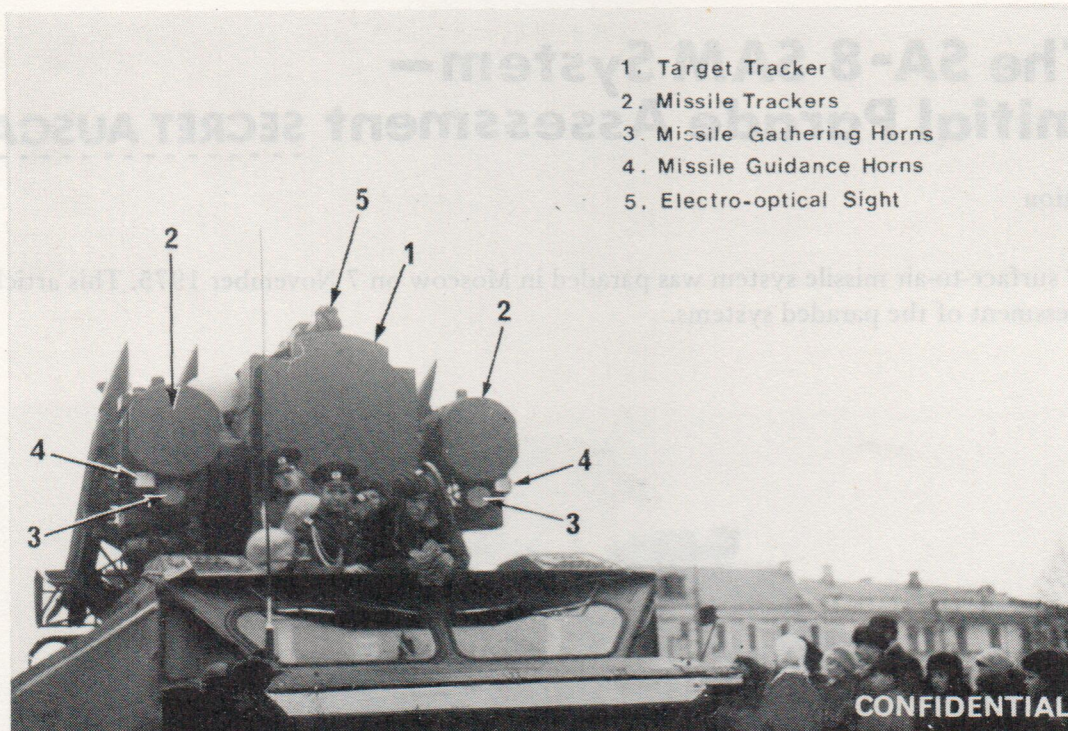


Fig 2 SA-8 Radar Assembly

The radar assembly is similar in appearance to the Soviet naval system (SA-N-4) POP GROUP but has two missile trackers. This gives the system the facility to control two missiles at the same time launched against one target.

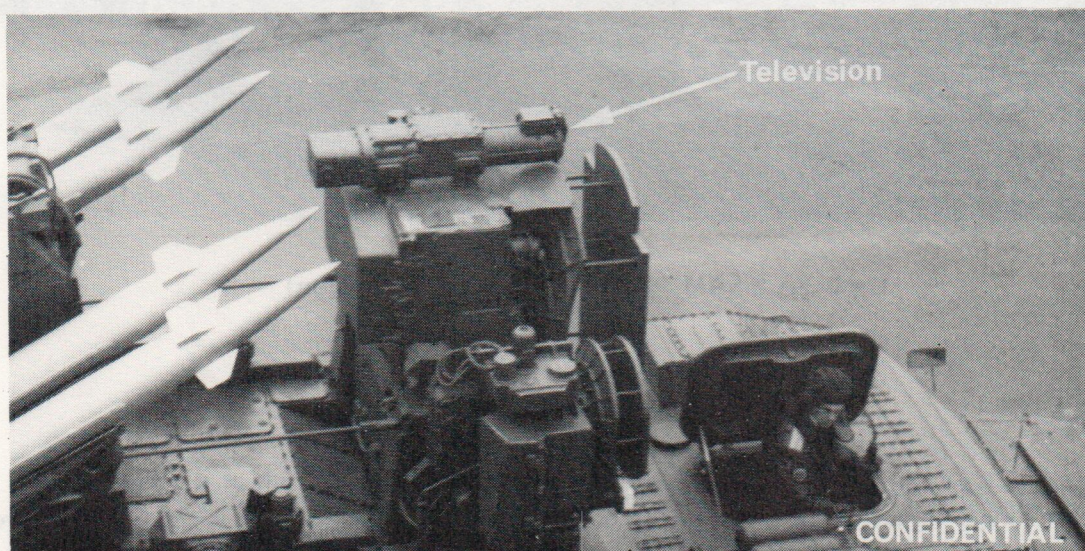


Fig 3 SA-8 New Electro Optical Tracker

The short vehicle system uses a SA-3/SA-4 TV tracker and the longer vehicle a TV tracker which has not been sighted before. The longer vehicle also has a raised ramp-like section either side of the centre hatch the purpose of which is not yet known. Both vehicles have blast deflector plates to the front and rear.

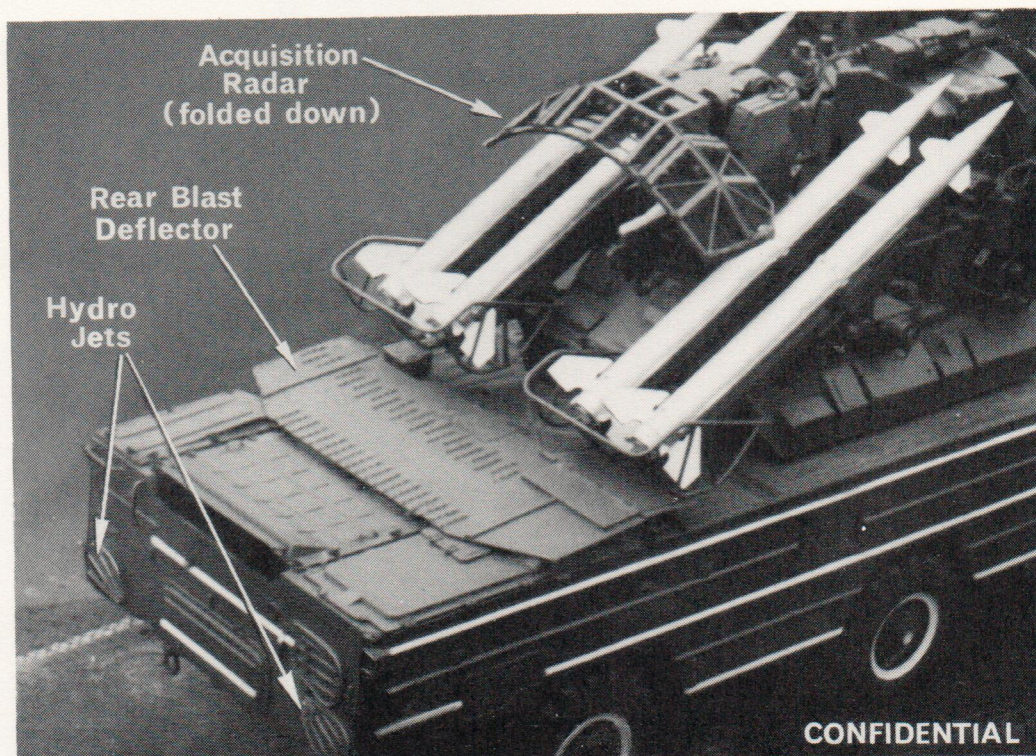


Fig 4 SA-8 Rear View

System Performance

System performance is now assessed as

Maximum range	11 km
Minimum range	2 km
Maximum altitude	5 km
Minimum altitude	30 m
Reaction time	10-12 seconds from detection to missile launch.

Employment

SA-8 is expected primarily to engage approaching targets and to have two main roles. Firstly, as a short range, point defence weapon integrated with a longer range system in defence of those large targets particularly susceptible to low level attack, such as airfields, and second as the prime defence for small important targets which cannot be protected effectively by area cover systems.

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Fig 4 SA-8 Rear View

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9. PORK TROUGH Variants SECRET AUSCANUKUS

PORK TROUGH is the NATO nickname for the Soviet ground surveillance radars SNAR-2, SNAR-2A and SNAR-6. SNAR-2 was first seen in the Soviet Union in 1958 and over the next four years it replaced LONG TROUGH (SNAR-1) in the Soviet Ground Forces. PORK TROUGH is deployed in artillery observation units at divisional level. It is thought that SNAR-6 has replaced SNAR-2/2A completely within GSFG.

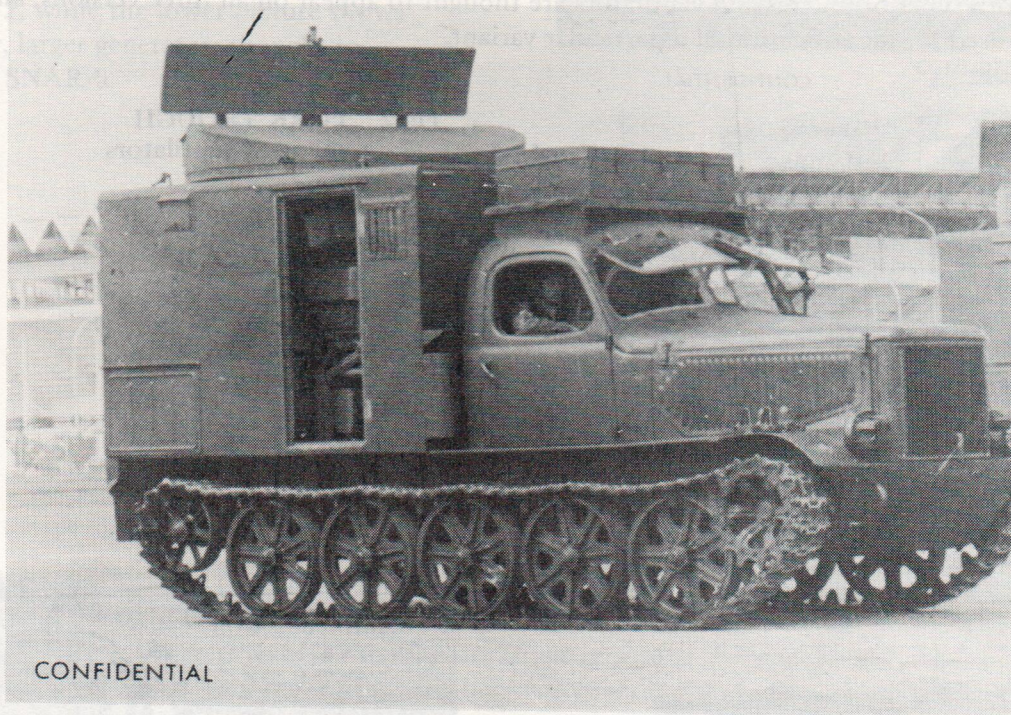


Fig 1 PORK TROUGH

PORK TROUGH is manned by a four man crew and can be sited and orientated in 7 minutes and operated after a further 4 minutes which are required for the set to warm up. It is generally sited on forward slopes, with the antenna about 10 to 20 metres above the terrain to be surveyed. The position selected will normally be 2 or 3 kms behind the FEBA to provide protection from direct fire weapons. Alternate positions are selected as this radar is very vulnerable to physical and electronic counter measures.

In addition to its battlefield surveillance role, PORK TROUGH can also be used for coastal surveillance and for the adjustment of artillery fire.

SNAR-2 and SNAR-2A

SNAR-2 is mounted on a tracked, light artillery tractor AT-2. SNAR-2A is a later version of SNAR-2 but its operational and physical characteristics are similar. The most significant changes are a better frequency coverage and an increase in the peak power output from between 40 and 60 kW to between 60 and 100 kW which increases the range.

SNAR-6

In 1966 another version began to appear. This was SNAR-6, which operates at about 15 GHz instead of the 9 GHz frequency of SNAR-2 and SNAR-2A. As there is no change in the antenna, this increase in frequency indicates a narrower beamwidth. Hence SNAR-6 is more accurate and less vulnerable to electronic counter measures.

Visual Differences

SNAR-2, SNAR-2A and SNAR-6 appear at first sight to be externally identical. However, there are four differences which can be seen. Two of them, seem to be unimportant and can be seen in figures 2 and 3. These are the changes in the shape of the ventilators and in the design of the engine cooling louvres. Both types of louvres and ventilators are thought to appear on all three versions, and so they cannot be used for identification of a particular variant.

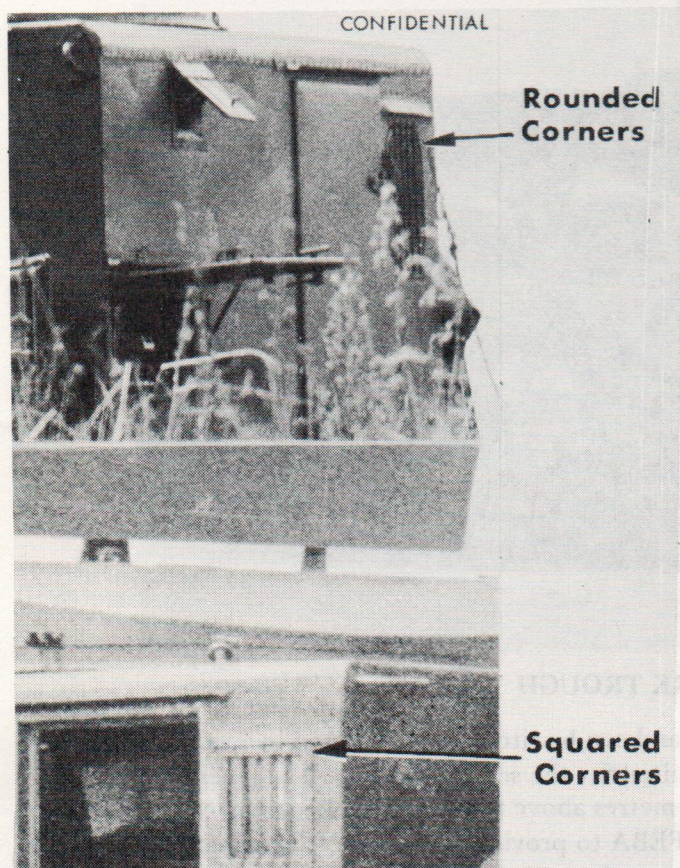
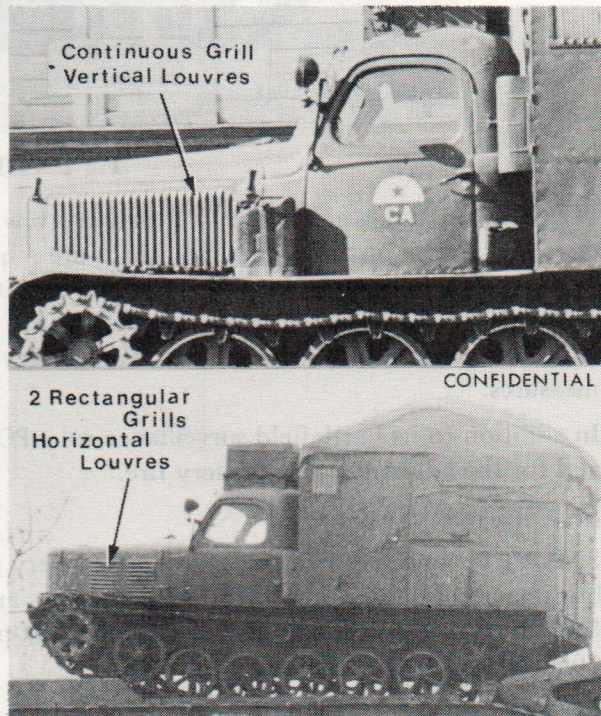


Fig 3 PORK TROUGH
change in cooling louvres

Fig 2 PORK TROUGH
shape of ventilators



The third change seems to be far more significant, and this is the change in generator. In figure 4, the top picture shows the original generator and it is quite clearly smaller than the later version in the lower picture. An increase in frequency requires an increase in power if the same range is to be achieved with the same antenna, and the old generator may not have been able to produce this extra power. It is considered that this change of generator indicates the change from SNAR-2 and SNAR-2A to SNAR-6.

Fig 4 Change in Generator

The upper picture shows the older generator which is thought to belong to SNAR-2, while the lower picture shows the newer, larger generator, thought to belong to SNAR-6.



The fourth change appears to be linked to the change in generator. This is the appearance of an extra hatch cover on the right hand side of the body as shown in figure 5. The addition of this hatch cover presumably allows a larger airflow for cooling the larger generator and enables the mechanic to service the generator more easily, as there is less room between generator and vehicle body than previously.

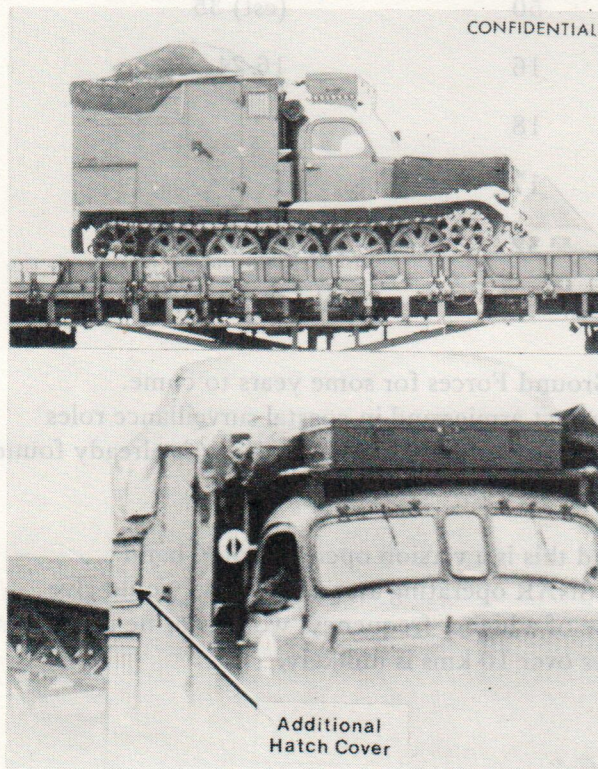


Fig 5 Addition to Second Hatch Cover

The lower picture shows an additional hatch cover which is thought to be present on SNAR-6 but not SNAR-2.

Electronic Differences

It is much easier to distinguish between SNAR-2 and SNAR-6 electronically as both the frequency and the pulse repetition frequency are different. Electronic characteristics for SNAR-2, SNAR-2A and SNAR-6 are listed below for comparison.

	SNAR-2	SNAR-2A	SNAR-6
Frequency (MHz)	9 GHz band	9220-9520	14190-15790
PRF (pps)	3000 or 6000	2996 or 5992	8095-8101 8319-8344 (usual) 4140-4181
Pulse Duration (μ s)	0.1 or 0.2	0.1 or 0.15	0.1-0.2
Polarisation	Probably vertical	Vertical	Vertical
Peak Power (kW)	40-60	60-100	?
Beamwidth	(est) 1° horizontal 4.5° vertical	1.1° horizontal 5.8° vertical	(est) 0.7° horizontal (est) 3.6° vertical
Scan Type	Sector (26°-28°)	Sector (27°)	Unidirectional sector
Scan Rate (Hz)	10-12	11	3.9-4.6
Ranges (km):			
Maximum	32	50	(est) 35
Against T-54 tank	14	16	16-24
Against ZIL truck	15	18	?
Against trawler	?	17	?
Against destroyer	25	32	?

Future

SNAR-6 is likely to remain in service with the Soviet Ground Forces for some years to come. SNAR-2/2A is likely to be found in non-Soviet Warsaw Pact armies and in coastal surveillance roles during the same period, and could be exported to an increasing number of countries; it is already found extensively in the Middle East.

Another PORK TROUGH variant has been reported and this is a version operating at K-band (20-40 GHz), but there is little firm evidence as yet. A SNAR operating at, say, 35 GHz would give extremely accurate target data. A reduced range, because of a higher frequency, would not be important on the battlefield where line of sight to targets at ranges over 10 kms is unlikely.

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